Summary of Stream Habitat and Fish Inventories in Compartment 155, Enoree Ranger District, Sumter National Forest, South Carolina, 2009 and 2011

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Introduction

Sumter National Forest (SNF) Compartment 155 contains a small unnamed tributary to the Enoree River that is undergoing active head-cutting. Timber was harvested within the compartment in summer 2008 (Figure 1). In 2009, the SNF requested assistance from the USDA Forest Service, Southern Research Station, Center for Aquatic Technology Transfer (CATT) with stream habitat and fish inventories on the unnamed tributary. The CATT deployed a 4-person crew to Compartment 155 in April 2009 to collect data needed for baseline monitoring and planning of mitigation efforts (Krause et al. 2009). In August 2010, the SNF installed sediment check-dams upstream of the stream's perennial portion and seeded native grasses in the timber harvest area (Jeanne Riley, personal communication). In summer 2011, the SNF requested additional assistance with post-implementation inventories in Compartment 155. On August 4, 2011 the CATT deployed a 4-person crew to re-inventory stream habitat and fish. Our objective in 2011 was to document post-implementation conditions for comparison with pre-implementation (2009) conditions.

Methods

Habitat Inventory

In 2009, we performed a basinwide visual estimation technique (BVET) habitat inventory on 2.7 km of the unnamed tributary extending from the USFS boundary to where the channel ran dry (Dolloff et al. 1993; Krause et al. 2009). In 2011, we performed a BVET inventory on 0.46 km of the unnamed tributary starting at the downstream edge of the 2008 timber harvest and ending where the channel ran dry (Figure 1). Because the 2009 inventory encompassed a greater reach length, this report uses only the 2009 data collected within timber harvest area for comparison with the 2011 data (for complete 2009 results see Krause et al. 2009).

We recorded the following attributes (see Krause et al. 2009, appendix B, for detailed descriptions):

- Habitat unit type (pools, riffles…)
- Habitat unit wetted width (visually estimated)
- Habitat unit maximum and average water depth
- Distance
- Dominant and subdominant substrate
- Percent fines
- Percent bank instability
- Large wood

At a subset of habitat units we measured:

- Habitat unit wetted width
- Bankfull channel width
- Flood prone riparian width for both left and right bank
- Bank height for left and right bank

- Channel gradient
- Percent canopy cover
- Water temperature

We noted, photographed, and recorded GPS coordinates for stream features including:

- Waterfalls
- Tributaries
- Side channels
- Braided channels
- Seeps (springs)
- Landslides
- Bridges
- Fords
- Dams
- Culverts

In addition, we hung flagging to divide the stream into electrofishing reaches. We attempted to divide the stream into 100 m long reaches using natural habitat unit breaks to separate the adjoining reaches, however reach length varied due to natural variation in the location of habitat unit breaks.

Fish Inventory

We electrofished 5 adjoining reaches delineated during the habitat inventory (see above). The reaches in 2009 versus 2011 do not overlap exactly due to the different start locations for the habitat inventories (Figure 1). We made a single pass (no block nets) through each reach using an Appalachian Aquatics backpack electrofishing unit (200v AC). We stopped at the upstream end of each reach to record the total number of individuals of each species captured.

Results

The CATT and SNF personnel completed habitat and fish inventories on the unnamed tributary to the Enoree River within the timber harvest area before (2009) and after (2011) mitigation treatments. Most habitat attributes were similar between years. There was less than 5 cm difference in pool and riffle average, maximum, and residual water depths (Table 1), bank instability differed by no more than 10% (Table 2), and substrates were dominated by sand in both years (Table 3). One notable difference was a large increase in quantity of the smallest size class of large wood within the bankfull channel (Table 4). The increased wood quantity occurred primarily within a few habitat units around the 200 m inventory distance (Figure 2).

We electrofished 5 adjoining reaches (reach lengths ranged from 62 – 105 m), which totaled 483 m in 2009 and 462 m in 2011 (Table 5). Only one fish species, creek chub (*Semotilus atromaculatus*), was present within the timber harvest area in 2009 and 2011 (Figure 3 and Table 5). Adult fish distribution was similar between years, but young-of-year expanded their distribution in 2011. Both adult and young-of-year were much more abundant in 2011, resulting in more than a 6-fold increase in total creek chubs (Figure 3 and Table 5).

Discussion

The most notable changes between the 2009 and 2011 inventories are the increases in large wood and creek chubs. The increase in wood could be a result of the small riparian buffer left after the timber harvest (Jeanne Riley, personal communication). Small buffers of trees left standing adjacent to a stream are more susceptible to breakage or blow-down during wind and storm events (Ruel et al. 2001; Steinblums et al. 1984). Increases in large wood are generally regarded as beneficial to stream habitat and biota, however resulting debris jams can trap and store fine sediments in the channel, which can hinder the flushing of fine sediment (Lisle and Napolitano 1998). Given that most pieces of wood added since 2009 are relatively small and thus subject to quick breakdown and transport, removal of wood to increase sediment transport is not justified.

The surveyed reach has a substantial fine-sediment load and given its position high in the watershed, is likely subject to frequent de-watering or intermittent flow. Creek chubs are regarded as tolerant to degraded stream conditions, including poor water quality and heavy silt loads (Jenkins and Burkhead 1993; Pirhalla 2004; Rohde et al. 2009), and have the ability to rapidly recolonize following disturbances such as drought (Adams and Warren 2005). Adams and Warren (2005) suggest that the ability of creek chubs to rapidly recolonize is a result of prolific reproduction, a suggestion that would explain the increase in young-of-year creek chubs captured in our 2011 inventory.

The 2011 inventories were conducted just one year after installation of sediment check-dams and native grass seeding. Meals at al. (2010) found there is often a substantial lag time lasting years to decades in the response of water quality, stream habitat, and biota to sediment mitigation efforts. Additional inventories over a longer timeframe will provide a more reliable assessment of how the stream habitat and biota has responded. Additionally, due to budget constraints the 2011 inventory covered only a small portion of the 2009 inventory. Expanding the scope of future monitoring inventories would enable assessment of the response of less tolerant fish species present downstream of the 2011 reach. If sediment input is indeed reduced, we would expect future monitoring to find an increase in pool and residual depths, a decrease in bank instability, and a decrease in habitat units with sand as their dominant substrate. Such changes in stream habitat should benefit less tolerant fish species. However, if there is a large amount of fine sediment in the watershed from legacy land-use, improvements resulting from mitigation may not be evident in the near future without additional instream channel and stream bank rehabilitation efforts (Meals et al. 2010; Shields et al. 2007).

Data Availability

The 2009 and 2011 habitat and fish data are stored in a Microsoft Access database, which is kept at the CATT and an offsite backup (O:\RD\SRS\Site\BlacksburgVA\Admin\CATT Center for Aquatic Technology Transfer\National Forest System\ACCESS Databases), and a copy has been provided to the SNF. We will support the migration of this data into the USFS database tool, Natural Resource Information System Aquatic Surveys (NRIS AqS), as needed. In the interim, we are working with the SNF to develop custom queries and reports for the MS Access database. Jeanne Riley, SNF Fish Biologist, received a copy of all data in electronic format. Past reports are available on the CATT website: www.srs.fs.usda.gov/catt.

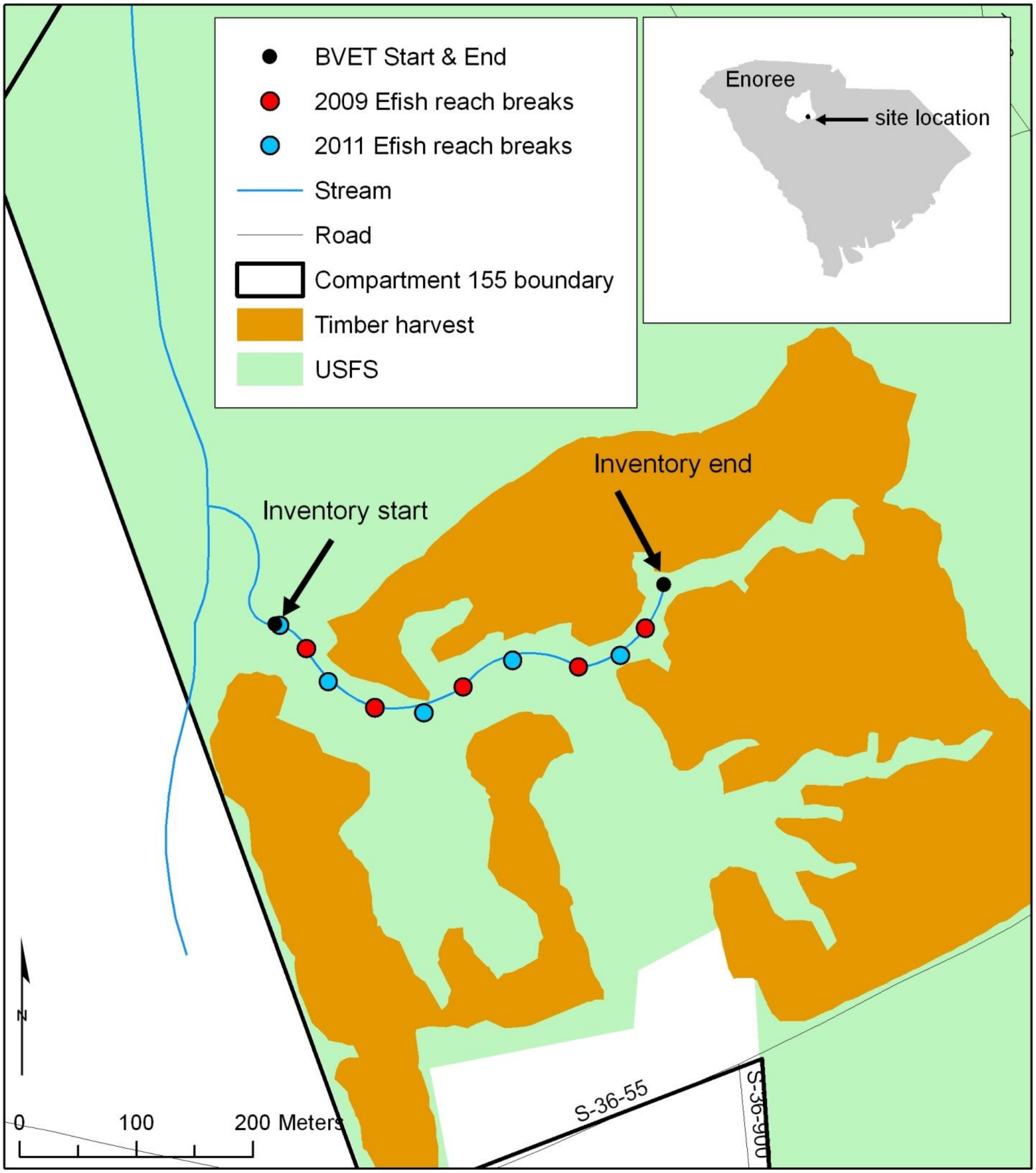

Figure 1. Location of the unnamed tributary to the Enoree River and the start and end locations of the stream habitat and electrofishing inventories within the timber harvest area (Enoree Ranger District, SC).

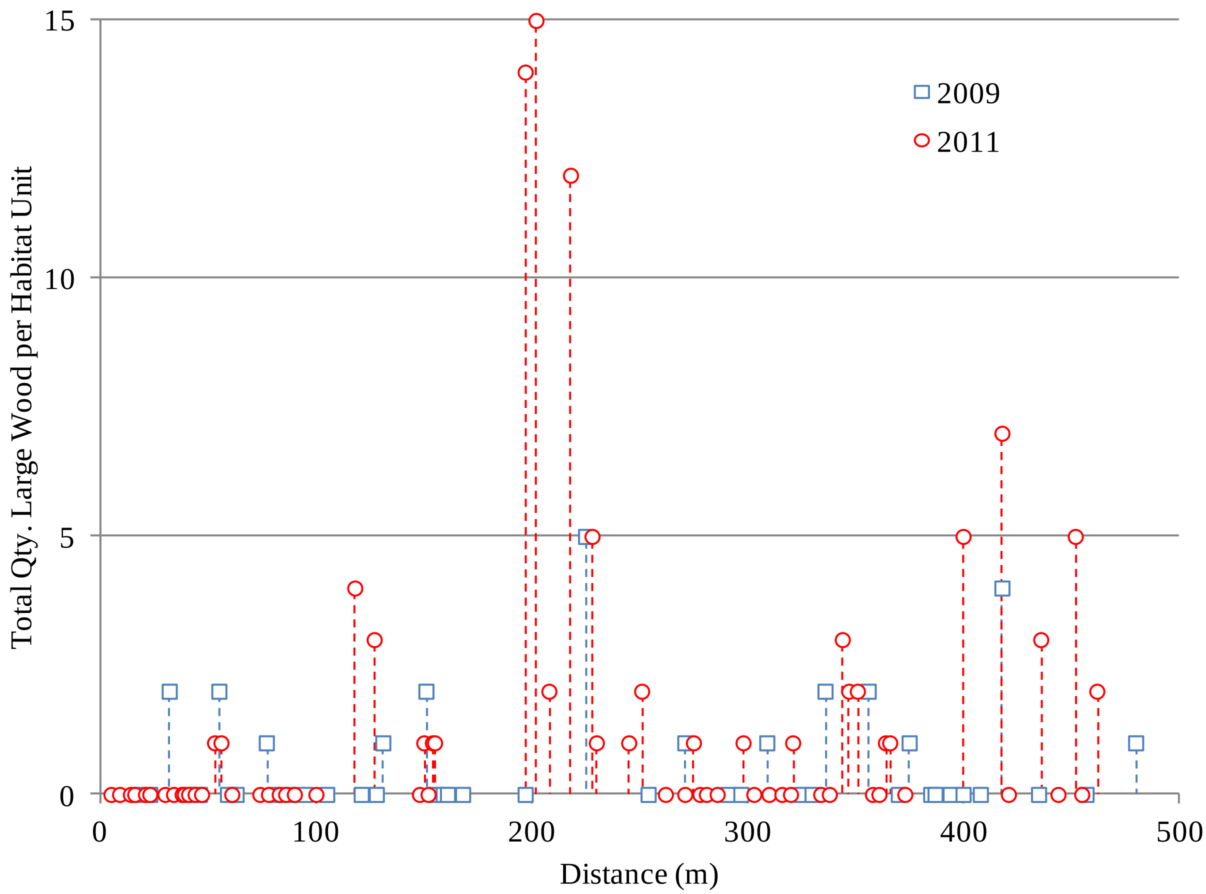

Figure 2. Total count of observed large wood (size classes 1, 2, 3, 4, and RW) per habitat unit in the unnamed tributary to the Enoree River within the timber harvest area in 2009 and 2011 (Enoree Ranger District, SC).

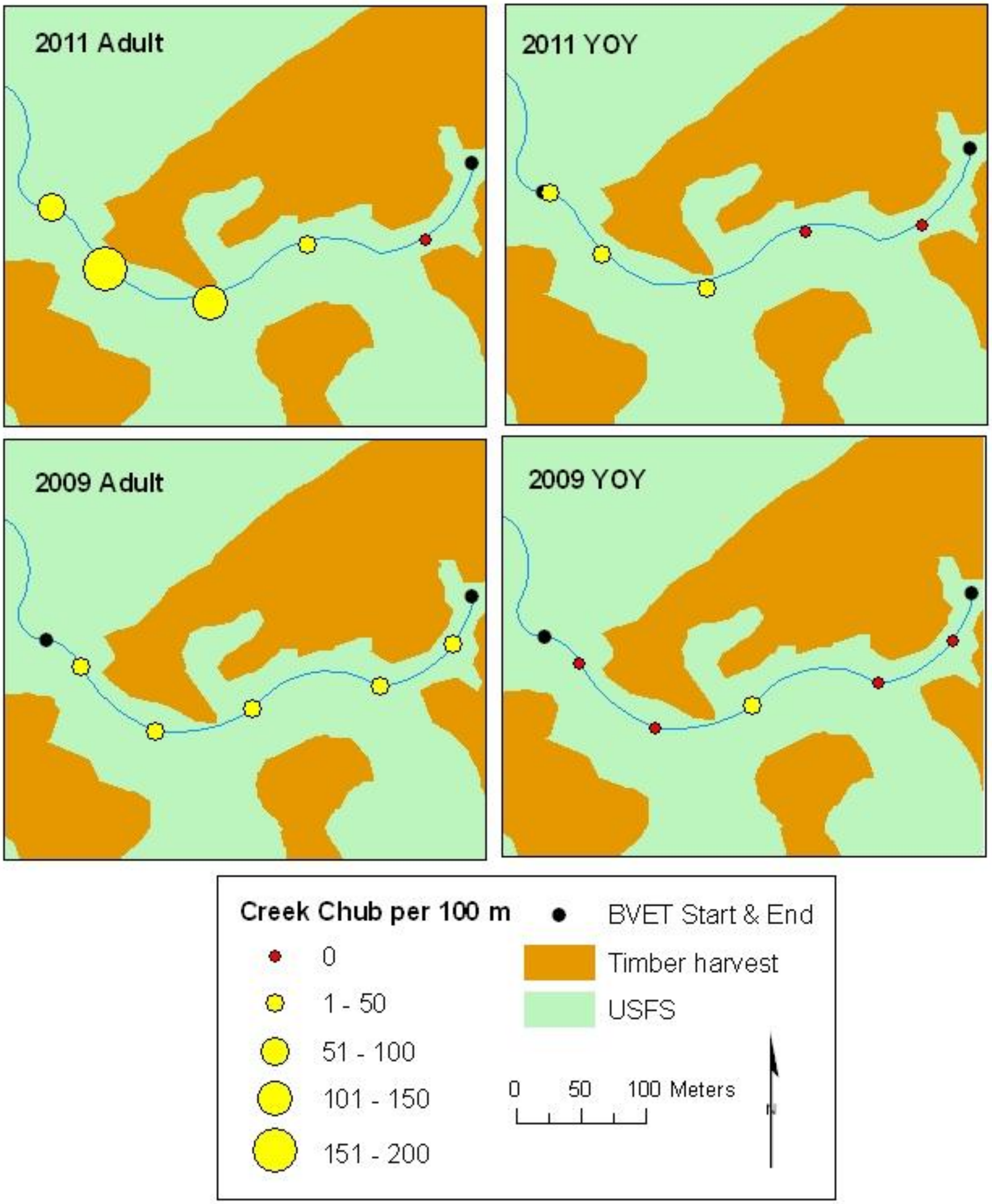

Figure 3. Distribution and quantity of adult and young-of-year (YOY) creek chubs captured in 2009 and 2011 in the unnamed tributary to the Enoree River (Enoree Ranger District, SC).

Table 1. Summary of channel characteristics inventoried for the unnamed tributary to the Enoree River.

	2009		2011	
	Pools	Riffles	Pools	Riffles
Percent of Total Stream Area	NA	NA	76	24
Total Area (m^2)	NA	NA	342 ± 39	105 ± 81
Correction Factor Applied	NA	NA	1.06	1.99
Number of Paired Samples	3*	1*	8	5
Total Habitat Unit Count	30	9	35	21
Number of Habitat Units per km	63	19	76	45
Mean Habitat Unit Area (m^2)	NA	NA	10	5
Mean Maximum Depth (cm)	31	12	30	8
Mean Average Depth (cm)	13	5	17	5
Mean Residual Depth (cm)	11	--	13	--
Percent Inventoried as Glides	53	--	29	--
Percent Inventoried as Runs	--	11	--	5
Percent Inventoried as Cascades	--	0	--	5

*Area could not be calculated for 2009 due to a lack of paired samples.

Table 2. Summary of bank instability (percent of stream bank material between edge of wetted channel and top of bankfull channel that consists of exposed erodible materials rounded to nearest 5%) inventoried for the unnamed tributary to the Enoree River.

	2009		2011	
	Avg.	n	Avg	n
Bank Instability (%)	20	39	30	56
Bank Instability Slow-water units only (%)	20	30	30	35
Bank Instability Fast-water units only (%)	25	9	25	21

Table 3. Percent and count of habitat units with specified dominant and subdominant substrate types.

Substrate Type	Size Range / Description	2009				2011			
		Dominant		Subdominant		Dominant		Subdominant	
		%	n	%	n	%	n	%	n
Organic matter	dead leaves, detritus	28	11	13	5	4	2	25	14
Clay	sticky in texture	0	0	0	0	0	0	0	0
Silt	slippery in texture	0	0	0	0	0	0	2	1
Sand	grainy; silt - 2 mm	51	20	38	15	71	40	16	9
Small gravel	3 - 16 mm	5	2	26	10	4	2	18	10
Large gravel	17 - 64 mm	3	1	10	4	0	0	14	8
Cobble	65 - 256 mm	0	0	0	0	2	1	9	5
Boulder	>256 mm	3	1	5	2	4	2	5	3
Bedrock	solid rock, parent material	10	4	8	3	16	9	11	6

Table 4. Number of large wood pieces within the 2009 and 2011 inventory reach.

Size Class	Large Wood Size Range	Count of Pieces	
		2009	2011
1	< 5 m long, 10 cm - 55 cm diameter	15	75
2	< 5 m long, > 55 cm diameter	0	1
3	> 5 m long, 10 cm - 55 cm diameter	10	15
4	> 5 m long, > 55 cm diameter	0	0
RW	Rootwad	0	7
	Total:	25	98

Table 5. Length of electrofished reaches and counts of fish species captured by electrofishing the unnamed tributary to the Enoree River.

Year	Inventory Reach (m)			Common Name	Scientific Name	Fish Count		GPS (UTM NAD83)
	Start	End	Length			Adult	YOY	Sample Reach Start
2009	0	94	94	Creek Chub	*Semotilus atromaculatus*	11	0	17 S 458902 3806312
	94	199	105	Creek Chub	*Semotilus atromaculatus*	13	0	17 S 458961 3806261
	199	302	103	Creek Chub	*Semotilus atromaculatus*	20	3	17 S 459036 3806279
	302	404	102	Creek Chub	*Semotilus atromaculatus*	30	0	17 S 459135 3806296
	404	483	79	Creek Chub	*Semotilus atromaculatus*	1	0	17 S 459192 3806329
		Total:	483		Total:	75	3	
2011	0	100	100	Creek Chub	*Semotilus atromaculatus*	66	26	17 S 458880 3806331
	100	197	97	Creek Chub	*Semotilus atromaculatus*	182	36	17 S 458907 3806268
	197	298	101	Creek Chub	*Semotilus atromaculatus*	115	32	17 S 459003 3806257
	298	400	102	Creek Chub	*Semotilus atromaculatus*	36	0	17 S 459079 3806302
	400	462	62	Creek Chub	*Semotilus atromaculatus*	0	0	17 S 459171 3806306
		Total:	462		Total:	399	94	

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Appendix A : BVET Inventory Data

Table A1 (1 of 2). 2009 BVET inventory data from within the timber harvest area. Inventory start 17 S 458876 3806333 and end location 17 S 459208 3806366 (UTM NAD83); Enoree Ranger District, SC.

Habitat Type	Distance (m)	Unit Length (m)	Wetted Width (m)	Area (m2)	Max Depth (cm)	Avg. Depth (cm)	Dominant Substrate	Subdominant Substrate	% Fines	% Bank Instability	Wood Qty. by Size Class				
											1	2	3	4	RW
Riffle	17	17	0.6	10.0	25	5	Bedrock	Sand	35	10	0	0	0	0	0
Pool	23	6	1.7	9.9	25	10	Boulder	Sand	35	10	0	0	0	0	0
Riffle	32	9	0.6	5.3	10	5	Small Gravel	Sand	35	55	1	0	1	0	0
Glide	40	8	2.0	16.0	20	10	Bedrock	Sand	25	30	0	0	0	0	0
Riffle	44	4	3.5	14.2	15	5	Bedrock	Sand	10	10	0	0	0	0	0
Glide	46	2	1.1	2.1	20	10	Bedrock	Sand	30	45	0	0	0	0	0
Pool	55	9	1.5	13.8	45	25	Sand	Organic Matter	70	10	2	0	0	0	0
Riffle	59	4	0.8	3.3	10	5	Sand	Small Gravel	55	25	0	0	0	0	0
Pool	63	4	1.2	4.7	30	15	Sand	Bedrock	55	25	0	0	0	0	0
Glide	77	14	1.2	16.5	35	20	Sand	Bedrock	75	30	0	0	1	0	0
Riffle	81	4	0.6	2.4	5	5	Small Gravel	Sand	40	30	0	0	0	0	0
Pool	88	7	1.4	9.9	40	20	Sand	Organic Matter	70	25	0	0	0	0	0
Glide	95	7	0.9	6.6	15	5	Sand	Small Gravel	70	60	0	0	0	0	0
Riffle	105	10	0.9	9.4	5	5	Sand	Large Gravel	55	45	0	0	0	0	0
Glide	121	16	1.2	18.9	25	10	Sand	Large Gravel	55	35	0	0	0	0	0
Glide	128	7	1.2	8.3	25	10	Sand	Small Gravel	70	20	0	0	0	0	0
Pool	131	3	1.8	5.3	55	30	Sand	Large Gravel	60	15	0	0	1	0	0
Glide	151	20	1.5	30.7	45	20	Sand	Small Gravel	75	15	2	0	0	0	0
Pool	156	5	1.4	7.1	45	20	Sand	Boulder	60	30	0	0	0	0	0
Riffle	159	3	0.7	2.1	5	5	Sand	Organic Matter	45	15	0	0	0	0	0
Pool	161	2	1.5	3.1	50	35	Sand	Small Gravel	60	10	0	0	0	0	0
Riffle	168	7	0.8	5.8	15	5	Organic Matter	Sand	35	15	0	0	0	0	0
Gully	193														

Table A1 continued (2 of 2).

Habitat Type	Distance (m)	Unit Length (m)	Wetted Width (m)	Area (m2)	Max Depth (cm)	Avg. Depth (cm)	Dominant Substrate	Subdominant Substrate	% Fines	% Bank Instability	Wood Qty. by Size Class				
											1	2	3	4	RW
Glide	197	29	1.4	41.1	45	15	Sand	Small Gravel	70	15	0	0	0	0	0
Glide	225	28	0.8	23.1	25	10	Organic Matter	Sand	40	15	1	0	4	0	0
Gully	235														
Glide	254	29	1.1	30.8	30	10	Organic Matter	Sand	40	5	0	0	0	0	0
Glide	271	17	0.7	12.0	25	5	Organic Matter	Sand	45	15	0	0	1	0	0
Glide	291	20	0.9	18.9	30	10	Organic Matter	Sand	45	10	0	0	0	0	0
Pool	297	6	1.4	8.5	35	15	Sand	Small Gravel	55	10	0	0	0	0	0
Underground	309	12									1	0	0	0	0
Glide	325	16	0.8	13.2	15	5	Sand	Organic Matter	70	5	0	0	0	0	0
Pool	330	5	1.2	5.9	40	20	Sand	Small Gravel	70	25	0	0	0	0	0
Pool	336	6	0.8	5.0	10	5	Organic Matter	Sand	30	5	2	0	0	0	0
Tributary	340														
Run	356	20	0.6	11.8	20	5	Sand	Organic Matter	65	10	1	0	1	0	0
Pool	370	14	1.5	21.5	30	10	Organic Matter	Sand	35	5	0	0	0	0	0
Pool	375	5	1.4	7.1	25	10	Organic Matter	Small Gravel	25	25	1	0	0	0	0
Pool	385	10	1.5	15.3	45	15	Sand	Boulder	65	15	0	0	0	0	0
Underground	387	2									0	0	0	0	0
Glide	394	7	0.7	5.0	20	5	Organic Matter	Small Gravel	30	5	0	0	0	0	0
Underground	400	6									0	0	0	0	0
Glide	408	8	0.5	3.8	20	5	Large Gravel	Bedrock	10	10	0	0	0	0	0
Underground	418	10									3	0	1	0	0
Glide	435	17	0.7	12.0	25	10	Organic Matter	Sand	25	15	0	0	0	0	0
Pool	457	22	0.9	20.8	35	10	Organic Matter	Large Gravel	10	5	0	0	0	0	0
Underground	480	23									1	0	0	0	0

Table A2 (1 of 3). 2011 BVET inventory data from within the timber harvest area. Inventory start 17 S 458869 3806316 and end location 17 S 459207 3806361 (UTM NAD83); Enoree Ranger District, SC.

Habitat Type	Distance (m)	Unit Length (m)	Wetted Width (m)	Area (m2)	Max Depth (cm)	Avg. Depth (cm)	Dominant Substrate	Subdominant Substrate	% Fines	% Bank Instability	Wood Qty. by Size Class				
											1	2	3	4	RW
Riffle	5	5	1.5	7.5	10	5	Bedrock	Sand	20	35	0	0	0	0	0
Pool	9	4	2.1	8.5	15	5	Sand	Small Gravel	20	50	0	0	0	0	0
Waterfall	11														
Run	14	5	0.5	2.5	20	10	Bedrock	Sand	10	0	0	0	0	0	0
Riffle	16	2	0.5	1.0	5	5	Bedrock	Small Gravel	0	25	0	0	0	0	0
Pool	21	5	1.2	5.8	30	15	Cobble	Boulder	20	50	0	0	0	0	0
Underground	23	2									0	0	0	0	0
Riffle	30	7	0.5	3.5	15	5	Sand	Boulder	10	60	0	0	0	0	0
Pool	34	4	1.1	4.2	25	10	Bedrock	Sand	20	40	0	0	0	0	0
Pool	38	4	2.1	8.5	20	15	Bedrock	Sand	50	60	0	0	0	0	0
Pool	39	1	3.2	3.2	15	10	Bedrock	Sand	50	50	0	0	0	0	0
Cascade	41	2	3.0	6.0	10	5	Bedrock	Large Gravel	40	20	0	0	0	0	0
Pool	44	3	1.1	3.2	25	15	Bedrock	Cobble	50	75	0	0	0	0	0
Riffle	47	3	0.5	1.5	10	5	Boulder	Cobble	30	25	0	0	0	0	0
Pool	53	6	1.6	9.5	40	30	Sand	Small Gravel	50	40	1	0	0	0	0
Riffle	56	3	1.0	3.0	10	5	Small Gravel	Bedrock	50	10	1	0	0	0	0
Pool	61	5	1.1	5.3	30	25	Boulder	Small Gravel	60	10	0	0	0	0	0
Pool	74	13	1.6	20.7	55	35	Sand	Cobble	40	50	0	0	0	0	0
Riffle	78	4	1.0	4.0	5	5	Small Gravel	Sand	20	30	0	0	0	0	0
Pool	83	5	1.6	8.0	45	20	Sand	Small Gravel	50	40	0	0	0	0	0
Riffle	86	3	0.5	1.5	5	5	Sand	Large Gravel	30	80	0	0	0	0	0
Glide	90	4	1.1	4.2	15	10	Sand	Cobble	50	80	0	0	0	0	0
Riffle	100	10	1.0	10.0	10	5	Sand	Small Gravel	60	60	0	0	0	0	0

Table A2 continued (2 of 3).

Habitat Type	Distance (m)	Unit Length (m)	Wetted Width (m)	Area (m2)	Max Depth (cm)	Avg. Depth (cm)	Dominant Substrate	Subdominant Substrate	% Fines	% Bank Instability	Wood Qty. by Size Class				
											1	2	3	4	RW
Glide	118	18	1.1	19.1	15	10	Sand	Small Gravel	60	55	4	0	0	0	0
Pool	127	9	1.6	14.3	45	20	Sand	Large Gravel	60	25	3	0	0	0	0
Glide	148	21	1.6	33.4	40	20	Sand	Large Gravel	60	25	0	0	0	0	0
Pool	150	2	1.1	2.1	35	20	Sand	Boulder	75	20	1	0	0	0	0
Riffle	152	2	1.0	2.0	5	5	Sand	Silt	50	25	0	0	0	0	0
Pool	154	2	1.6	3.2	60	35	Sand	Cobble	70	0	1	0	0	0	0
Riffle	155	1	0.5	0.5	5	5	Sand	Organic Matter	50	0	1	0	0	0	0
Glide	197	42	1.6	66.8	35	20	Sand	Small Gravel	75	40	11	0	3	0	0
Riffle	202	5	1.0	5.0	15	5	Sand	Organic Matter	60	0	9	1	3	0	2
Glide	208	6	1.1	6.4	35	20	Sand	Organic Matter	70	10	2	0	0	0	0
Riffle	218	10	1.5	14.9	10	5	Organic Matter	Sand	50	20	9	0	1	0	2
Glide	228	10	1.6	15.9	25	15	Sand	Organic Matter	75	30	4	0	0	0	1
Riffle	230	2	0.5	1.0	5	5	Sand	Organic Matter	20	10	0	0	0	0	1
Glide	245	15	1.1	15.9	15	10	Sand	Organic Matter	60	10	1	0	0	0	0
Pool	251	6	1.1	6.4	30	20	Sand	Organic Matter	50	10	1	0	1	0	0
Riffle	262	11	1.5	16.4	10	5	Sand	Organic Matter	20	20	0	0	0	0	0
Glide	271	9	1.6	14.3	30	20	Sand	Large Gravel	50	15	0	0	0	0	0
Riffle	275	4	0.5	2.0	5	5	Sand	Small Gravel	20	10	1	0	0	0	0
Pool	278	3	1.6	4.8	45	30	Sand	Bedrock	40	10	0	0	0	0	0
Riffle	281	3	1.5	4.5	5	5	Bedrock	Sand	30	10	0	0	0	0	0
Pool	286	5	1.6	8.0	35	15	Sand	Bedrock	40	20	0	0	0	0	0
Underground	298	12									1	0	0	0	0
Glide	303	5	1.1	5.3	25	15	Sand	Organic Matter	40	10	0	0	0	0	0

Table A2 continued (3 of 3).

Habitat Type	Distance (m)	Unit Length (m)	Wetted Width (m)	Area (m2)	Max Depth (cm)	Avg. Depth (cm)	Dominant Substrate	Subdominant Substrate	% Fines	% Bank Instability	Wood Qty. by Size Class				
											1	2	3	4	RW
Riffle	310	7	0.5	3.5	5	5	Sand	Small Gravel	30	40	0	0	0	0	0
Glide	316	6	1.1	6.4	20	10	Sand	Organic Matter	50	25	0	0	0	0	0
Riffle	320	4	0.5	2.0	5	5	Sand	Bedrock	30	10	0	0	0	0	0
Pool	321	1	1.1	1.1	40	15	Sand	Bedrock	60	20	0	0	0	0	1
Tributary	327														
Riffle	334	13	1.0	12.9	5	5	Sand	Large Gravel	30	25	0	0	0	0	0
Pool	338	4	1.1	4.2	30	20	Sand	Large Gravel	30	20	0	0	0	0	0
Underground	344	6									2	0	1	0	0
Pool	347	3	0.5	1.6	20	10	Sand	Organic Matter	40	10	2	0	0	0	0
Underground	351	4									2	0	0	0	0
Pool	358	7	0.5	3.7	15	10	Sand	Organic Matter	40	20	0	0	0	0	0
Underground	361	3									0	0	0	0	0
Pool	364	3	1.6	4.8	20	10	Sand	Bedrock	50	40	1	0	0	0	0
Underground	366	2									1	0	0	0	0
Pool	373	7	1.6	11.1	30	15	Sand	Large Gravel	40	25	0	0	0	0	0
Underground	400	27									3	0	2	0	0
Underground	418	18									5	0	2	0	0
Pool	421	3	0.5	1.6	10	5	Sand	Organic Matter	80	25	0	0	0	0	0
Underground	436	15									2	0	1	0	0
Pool	444	8	0.8	6.4	35	25	Sand	Organic Matter	80	10	0	0	0	0	0
Underground	452	8									4	0	1	0	0
Pool	455	3	1.1	3.2	35	25	Organic Matter	Sand	80	10	0	0	0	0	0
Underground	462	7									2	0	0	0	0